

2016

Leopold Center for Sustainable Agriculture, 2015-2016 Annual Report

Leopold Center for Sustainable Agriculture

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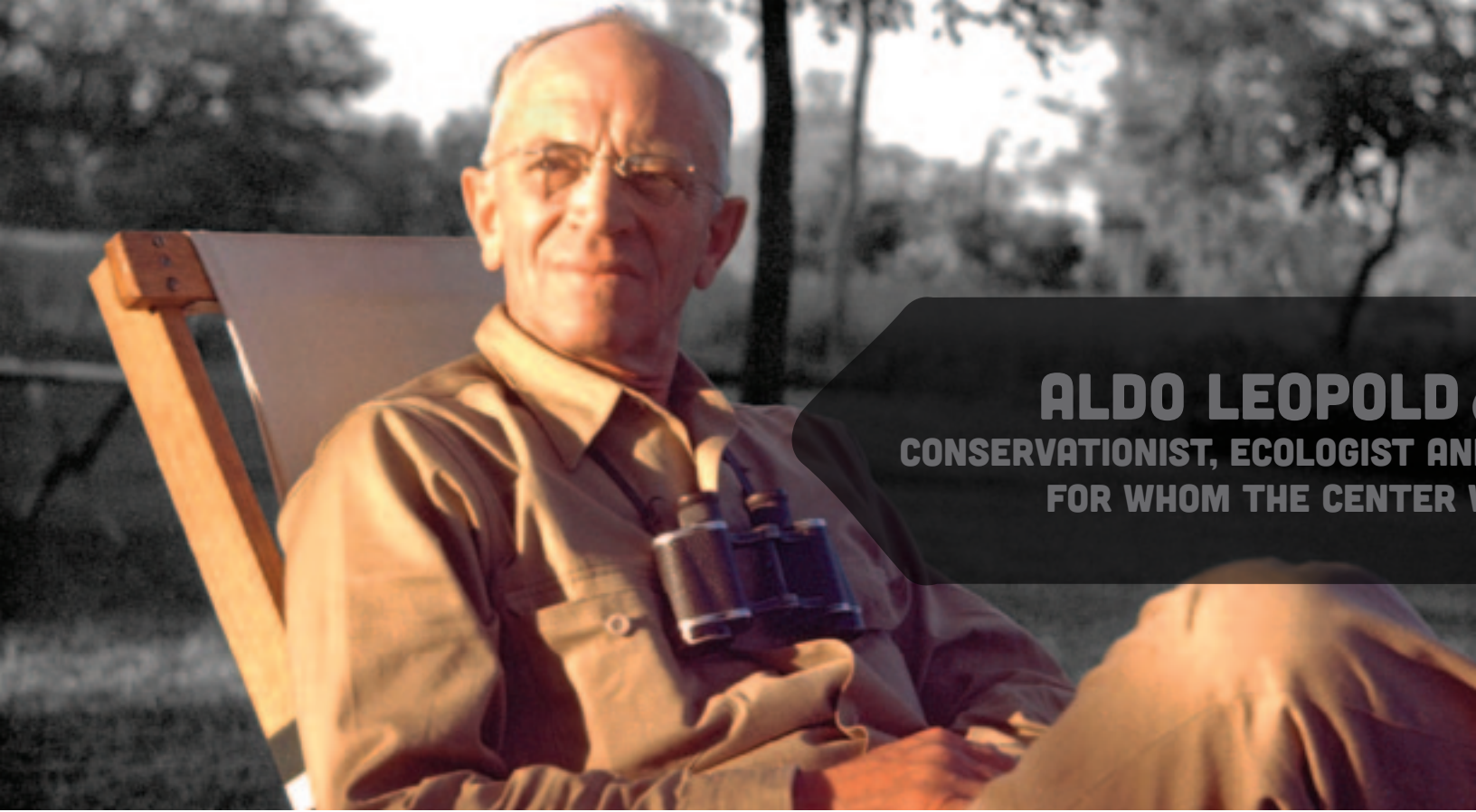


LEOPOLD CENTER
FOR SUSTAINABLE AGRICULTURE



2015/2016
ANNUAL REPORT





ALDO LEOPOLD
CONSERVATIONIST, ECOLOGIST AND
FOR WHOM THE CENTER V

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Mission: The Leopold Center was established by the Iowa Legislature as part of the Iowa Groundwater Protection Act of 1987. Its legislatively mandated goals are to identify and reduce negative environmental and socio-economic impacts of agricultural practices, contribute to the development of profitable farming systems that conserve natural resources, and cooperate with Iowa State University Extension to inform the public of new findings.

Vision: The Leopold Center for Sustainable Agriculture explores and cultivates alternatives that secure healthier people and landscapes in Iowa and the nation.

Information for this report was compiled by Leopold Center staff with the help of its researchers and educators, who are committed to improving Iowa agriculture and the lives of Iowans.

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Design: julsdesign, Ankeny, IA



OPTIMISM

(1887–1948)
D EDUCATOR
WAS NAMED.



We all face times when things can be difficult and challenging. Agriculture and farming are in one of those times. As I write this article, the USDA has predicted record yields and high levels of production for the year. While this sounds encouraging, in reality it means continued low prices and financial difficulties for many producers. Most enterprises, both crop and livestock, are having difficulty with profitability right now. Large-scale economic forces are contributing to the problem. Global agricultural production has been favorable in recent years even while consumer demand has been restrained and exports decreased. Fluctuations in the currency markets reverberate throughout many areas of the economy including agriculture. We also are seeing some of the consequences of a

long-standing policy that has allowed relentless consolidation in agribusiness. As a result, input costs remain stubbornly high, market opportunities are limited and the farmer's share of the consumer food dollar continues to decline.

Meanwhile, we continue to damage our agricultural and natural resources as we focus on intense production and short-term fixes without giving due consideration to the long term. In addition to financial challenges, problems persist with soil degradation, water quality, climate, nutrient management, habitat and biodiversity loss, pesticide misuse and broad spectrum chemical resistance in a growing number of agricultural weeds, pests and harmful microbes.

However, here at the Leopold Center, we are not given to a sense of despair. Instead we look for opportunities. We double our effort on sustainability and renew our focus for what the Leopold Center has long been known for doing. We continue to support research and demonstration work that can help address and educate many on these challenges. We support projects to improve soil health and water quality. Other projects, like STRIPS, also help restore habitat and biodiversity. We continue to develop, nurture and maintain relationships with many like-minded organizations, producers and landowners.

We sort through the results obtained to better understand these complex problems. Seldom are the results as clear as many expect and hope for. We also look to the horizon for emerging problems that may not yet be appreciated or understood. We search for new ideas that will help make agriculture and food systems more sustainable. We continue to support local foods and alternative markets even as the Leopold-spawned group becomes more independent and autonomous.

We also try to watch, listen and learn from what others are saying and doing. Some of the most interesting ideas are those we have not yet considered. We are proud of the work and the investigators that we support. We continue to look for methods to make agriculture more biological and sustainable for the long term.

So, in short, the Leopold Center for Sustainable Agriculture is doing what it has always done in terms of research, development, support and outreach. Some work is performed with great notoriety, some in relative obscurity; but all of it is important for now and for the future. In this annual report, you will read about many examples of this ongoing effort.

Mark Rasmussen
Director

THE VIEW FROM THE CHAIR



Erin Irish

During the dozen years I have served on the Leopold Center's advisory board, I have been impressed by the imagination and sincerity of the proposals we review. They aim to increase the sustainability of agriculture in Iowa, in ecology, marketing, and policy. Despite successes such as STRIPS, local food hubs, and cover crop protocols — all products of LCSA-supported research — I am frustrated that I see our landscape remaining dominated by exactly the same two row crops as I found when I came to Iowa as an assistant professor in 1990. Indeed, there has been an increase in conventional, monoculture agriculture. A recent report documented a net 97,000 acres in the last five years converted to row cropland from woodlands, an ecosystem previously deemed unsuitable for such use. Water quality has not improved appreciably, as evident from the size of the Mississippi River's Dead Zone in the Gulf of Mexico. I have seen exactly one monarch butterfly this summer.

The Leopold Center is potentially one of the state's best hopes for developing new approaches to agriculture that conserve natural resources, so that agriculture can be practiced for an indefinite future, yet be profitable to those carrying it out. The Center collectively has broad knowledge of the practices of agriculture in Iowa and a deep appreciation of the challenges faced by producers as well as costs and benefits that this enterprise imposes on the citizens of the state. My opinion is that the Center could be much more effective if it could take public positions on issues such as who

should take responsibility for the clean-up of fertilizer applied to farm fields, but delivered by drainage tiles to the sources for drinking water for urban areas. On dark days, I fear that the Center is window dressing, something to be held up as the token effort to address the issues recognized in the 1987 Groundwater Protection Act, while business as usual proceeds across most of the state. We have the tools to make changes on the landscape: what we lack is the voice to convince citizens of the state that if voluntary measures are ineffective, legislation can work. There's a Chinese proverb that says, "If we do not change our direction, we are likely to end up where we are headed."

Another more hopeful possibility is that the significant collection of scientific data and on-the-ground research that the Center has sponsored, funded, and warmly encouraged over the past three decades will begin to make a difference as citizens and policymakers take a much harder look at what we should do next. If the current paradigm isn't working well for us or the state's natural resources, the Leopold Center and its researchers and farmer-collaborators are continuing to search for the answers that will work. I hope that our policymakers will have the resolve to embrace more of these science-based solutions.

Erin Irish
Associate Professor of Biology,
University of Iowa, Leopold Center
Advisory Board Chair, 2015–2016



LEGACY LINGERS

A legacy is what we hand down from the past. It might be money or property, or something less tangible such as life membership in a society or club. It could be a set of ethics or standards for behavior that has been honored and shared among family members. A legacy implies that something of value is there to be passed on to the next generation.

Aldo Leopold's legacy remains clear nearly seven decades after his death. His biographer Curt Meine wrote: "One did not have to be especially prophetic to see that Leopold's legacy would not only remain relevant to conservation, but would continue to evolve in important new ways. Leopold's passion for wild places, for vibrant human landscapes and communities, for sound economies rooted in ecological realities, and for adventure and exploration crossed the sensitive fault lines of modern environmentalism and political ideology."

On the eve of the 30th anniversary of the Leopold Center's founding in 1987, we've considered what the Center's legacy might be for Iowa. Obviously, there is the significant body of knowledge amassed in the hundreds of research projects funded by the Center; on topics spanning water quality, nutrient management, livestock grazing, cover

crops, alternative conservation practices, soil health and the seminal work in local food systems development in Iowa.

Where did all these theories/ideas/concepts get examined and analyzed? There are demonstration plots and test sites all over the state, on ISU research farms, on private farms and acreages, and on government property. These pieces of land are home to field trials, long-running test plots, water monitoring systems, buffers and bioreactors created and maintained with Leopold Center support. They represent one significant portion of the Center's legacy in furthering on-the-ground testing and applications of research theories and projects. Another significant chunk of the Center's legacy rests with an army of hard-working graduate students—over 30 years there have been hundreds of them who have participated in research, studies, and experiments that were funded by the Leopold Center. That total includes the students in the ISU Graduate Program for Sustainable Agriculture whose work has been supported by stipends from the Center since the program started in 2004. Knowledge, land, and people; that seems like a legacy that Aldo Leopold would regard fondly.

However, just coasting on the wings of a legacy doesn't necessarily enhance it—complacency yields little benefit in the natural world, especially one facing as many challenges as ours. As Henry David Thoreau said, "What is the use of a house if you haven't got a tolerable planet to put it on?" Our goal at the Leopold Center is to make the planet more than just tolerable. We want to see it once again become truly hospitable to a wide variety of plants and crops, wildlife and livestock, healthy soil and clean water. That's a legacy all of us can all be proud of.

Mary Adams, Editor

2015–2016

LEOPOLD CENTER ADVISORY BOARD

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Doug Gronau, Farmer, Iowa Farm
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Gail Hickenbottom, Practical Farmers
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Erin Irish, Associate Professor of Biological
Sciences, University of Iowa (Board Chair)

Jody Kerns, Farmer, State Soil Conservation
Committee, Edgewood

Catherine Kling, Professor of Economics,
Iowa State University

Paul Lasley, Professor of Rural Sociology,
Iowa State University

Aaron Heley Lehman, Farmer, Iowa
Farmers Union, Polk City

Marc Linderman, Associate Professor
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Steve Mickelson, Professor of
Agricultural and Biosystems Engineering,
Iowa State University*

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of Agriculture and Land Stewardship

John Olthoff, Professor of Agriculture,
Dordt College, Sioux Center

Alicia Rosburg, Assistant Professor of
Economics, University of Northern Iowa*

Keith Summerville, Deputy Provost and
Associate Professor of Environmental Science
and Policy, Drake University, Des Moines

U. Sunday Tim, Professor of Agricultural and
Biosystems Engineering, Iowa State University*

*served part of the year only

Agribusiness Association of Iowa - position vacant

2015–2016

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*part-time or shared appointment

** served part of the year

CENTER'S WEBSITE IMPROVED AND STREAMLINED

The Leopold Center website went through an upgrade this year in order to keep current with its supporting software. In addition, the server that houses the website was nearly full of data. The Center's website contained information for more than 500 completed grants, plus publications, videos and photos, which all take up valued space on the shared server.

The transition to the newest software provided communications specialist Carol Brown with a chance to review and revise the website content. The completed grants were moved off the local server to the ISU Parks Library digital repository, with an entry appearing for every grant completed from 1992 to the present. Filed with each completed grant are a short description of the project, names of project investigators, and PDF files of a one-page summary and of a longer summary report. Also archived in the digital repository are

the publications, newsletters, and annual reports. This relocation process took nearly a year to complete.

As for the rest of the website, Brown reviewed every page to determine its relevance and how often users were visiting based on usage statistics. Pages were then streamlined, removed, or combined for greater readability. With the new software, the website now can easily accommodate those who visit on mobile devices such as smart phones, tablets and laptops, in addition to the traditional desktop computer user. Brown believes that visitors will find the new website to be user-friendly and information-rich.

Website:
www.leopold.iastate.edu

Digital repository:
<http://lib.dr.iastate.edu/leopold/>

"ALDO LEOPOLD, A STANDARD OF CHANGE" PERFORMED IN AMES

What would Aldo Leopold think if he was alive today? How would he reflect on *A Sand County Almanac* nearly 70 years later? Jim Pfitzer, a gifted impressionist and naturalist from Tennessee, offered an Ames audience of 100 a unique glimpse of how Leopold's mind worked in a performance at the ISU Alumni Center on April 9, 2016.

"Aldo Leopold, A Standard of Change," a one-man, one-act play written by and starring Pfitzer, is set in one evening in and around the famous Wisconsin Shack that inspired much of Leopold's writing. "A Standard of Change" explored the influences and challenges that led Leopold to penning some of the most important essays in *A Sand County Almanac*. The stage setting included a number of historical objects appropriate to Leopold's time and place, and Pfitzer's appearance on the stage at ISU was sponsored by the Leopold Center.

As the play opens, it has been 64 years since Leopold's death, and as many years since he has seen his now historic Shack. The play centers on the surprises, memories, emotions, and stories to be shared by the Center's namesake. Leopold's modern-day stand-in uses the forum to explore the effects of human progress on wildness as well as his own transformation as he learns the effects of his policies and changes his mind about how we manage wild places.



Jim Pfitzer as Aldo Leopold.

**FOLLOW US ON
FACEBOOK!**

PASSAGES

The Leopold Center welcomed a new staff member in November 2015 when **Carol Brown** became the third person to serve as the Center's communications specialist. She manages the Center's website and social media as well as producing the quarterly newsletter and monthly news briefs. Brown is no stranger to the Center; she worked part-time for the Center from 2007-2010 as part of a split appointment with the Iowa Learning Farms group. She served as communications officer for ILF and Water Rocks! for eight years. Prior to coming to ISU, Brown was the Director of Communications at Iowa Wesleyan College (now University) for 14 years.

Earlier, in July 2015, **Kim Vo** joined the Leopold Center staff as administrative specialist. Vo has had two decades of experience with ISU's financial system and handles the accounting and budgeting tasks for the Center. She reviews all proposal budgets, participates in the Leopold Center's grant application and submission process and responds to inquiries regarding grants, accounts, budgets and University policies and procedures. She previously had worked for Survey and Behavioral Research Services at the ISU Research Park.

The Center said goodbye to three long-time employees during the past year:

~ **Laura Miller**, the Center's second communications and media specialist with 17 years of service, retired in November 2015.

~ **Jeri Neal**, a 23-year Center veteran, the second program leader for the competitive grants program and later program coordinator for the Ecology Initiative, retired in December 2015.

~ **Corry Bregendahl**, associate scientist in charge of program evaluation since 2009, resigned in June 2016 to pursue other career interests.

FINANCES

The format of the financial statements in this annual report reflects the on-going efforts for more transparency begun in prior years. The state Agriculture Management Account (AMA) receipts are presented on an accrual basis and the Competitive Grants and Grant Infrastructure funds expended include only the cash paid out during the year (not the amount awarded).



FUNDS RECEIVED	2016	2015
State AMA Receipts	\$1,393,960	\$1,922,390
ISU Allocations	432,562	432,335
Foundation Funds	212,215	209,588
External Grants Activity	(168)	54,678
Funds Leveraged by LC/ISU Extension Staff **	0	53,403
Incentive/Discretionary Accounts	2,981	182
TOTAL FUNDS RECEIVED	2,041,550	2,672,576

FUNDS EXPENDED		
Personnel	782,131	816,531
Operations	121,790	111,526
Competitive Grants & Grant Infrastructure:		
Ecology Initiative	228,188	475,727
Policy Initiative	95,935	74,808
Marketing Initiative	170,536	252,953
Cross-Cutting Initiative	133,412	254,529
Special Commitments	1,894	0
Monthly Competitive Education Program	9,540	10,638
Total Competitive Grants & Grant Infrastructure	639,505	1,068,655
Foundation Accounts	181,799	243,351
External Grants Activity	0	105,041
TOTAL FUNDS EXPENDED	1,725,225	2,345,104

INCREASE/(DECREASE) IN FUNDS	316,325	327,472
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Funds, Beginning of Year	1,986,325	1,658,636
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FUNDS, END OF YEAR	\$2,302,650	\$1,986,108
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Competitive Grants AWARDED by Initiative		
Ecology	\$294,942	\$150,246
Policy	37,500	84,500
Marketing	111,261	125,565
Cross-Cutting (XP)	116,132	151,310
Total	\$559,835	\$511,621

Programs	FY2013	FY2014	FY2015	FY2016
Active Grants	81	114	98	76
New Grants	40	35	17	20
Number of Pre-proposals	54	48	56	40
Active Working Groups	10	10	10	12
Iowa Counties with Active Projects	47	47	45	40
Principal Investigators	64	76	74	50

Outreach				
Publications (Papers, Books, Etc.)	73	74	58	60
Website Unique Visitors (Monthly Average)	6,483	7,043	7,250	5,297*
Website Activity (Monthly Average)	18,773	19,046	18,250	14,706*
ISU Digital Repository Downloads (May/June 2016 Only)				2,477*
Educational Events	164	253	138	147
Reported Leveraged Funds by LC Projects	\$5.18M	\$5.71M	\$5.3M	\$3.3M

Center Stats				
Employees	13	14	14**	8
Interns/students	4	4	3	2

* New website went live May 20, 2016, moving archived material to the ISU Parks Library Digital Repository. Archived documents include completed grant reports, publications and papers, annual reports and quarterly newsletters. Downloads indicate a total of all categories from May 20-June 30, since the new site went live.

** Staff with joint LC/ISU Extension appointment in FY2015; in FY2016 became ISU only.

2016 SHIVVERS LECTURE WELCOMES A VARIED PANEL OF IOWA FARMERS

The Shivvers Memorial Lecture recently has showcased speakers on topics ranging from soil health to international economics to climate change. This year a panel of three Iowa farmers shared their practical solutions and personal experiences with conservation and sustainable agriculture practices.

“Farming for the Long Term” was presented at the ISU Memorial Union Sun Room on April 5, 2016. Each panelist brought a very different set of agricultural skills and experiences to the table. The panel was facilitated by Leopold Center Director Mark Rasmussen.

Nathan Anderson is a young farmer who graduated from Iowa State in 2010 with a degree in agronomy. He farms near Cherokee on an integrated crop/livestock farm and is interested in promoting farming designs that insure long-term sustainability. He is a commissioner for the Cherokee County

Soil and Water Conservation District and a member of Practical Farmers of Iowa. He offered the viewpoint of a more conventional farm operator.

Mike DeCook operates a ranch near Lovilla in southern Iowa, where he custom grazes cattle and raises grass-fed bison. He is committed to restoring biodiversity of native species and donated 200 acres of land to the Iowa Natural Heritage Foundation to be permanently protected by a conservation easement. DeCook provided a more nature-based, wildlife-friendly look at farming, particularly through his work with bison.

Laura Krouse is the owner of Abbe Hills Farm near Mount Vernon. In addition to operating a 200-member CSA and selling vegetables and eggs locally, she markets Abbe Hills Open Pollinated Seed Corn, an heirloom yellow dent corn grown on the farm since 1903. Krouse taught biology



*Shivvers panel (l to r)
Anderson, Krouse, DeCook, Rasmussen*

at Cornell College and is a longtime commissioner for the Linn County Soil and Water Conservation District. She gave the audience the perspective of a smaller-scale organic farmer with a different set of agricultural challenges.

The annual Shivvers Memorial Lecture series is endowed by the family members of the late John Shivvers who farmed near Knoxville, Iowa. This year's event was sponsored by the Leopold Center for Sustainable Agriculture and the ISU Committee on Lectures (funded by ISU Student Government). A podcast of this panel discussion is available at www.leopold.iastate.edu/2015-Shivvers-Lecture

NORTH IOWA FARM COUPLE HONORED WITH 2015 SPENCER AWARD

Tom and Irene Frantzen, long-time farmers, purveyors of organic pork, and disciples of sustainability were chosen to receive the 2015 Spencer Award for Sustainable Agriculture. The Frantzens farm near New Hampton in Chickasaw County, along with their son James.

The Frantzens have long believed that the integration of livestock is an integral part of an ecologically functioning farm. In 1995, Tom and Irene visited farms in Sweden, and learned about deep-bedded, antibiotic-free swine production as a more sustainable way of farming. They transitioned their entire operation away from a slat-floor, liquid manure system, to a deep-bedded hoop-house system, where the manure was mixed with straw bedding, which could be later used as a slow-release fertility source on their fields.

In 1998, the Frantzens were among the first 10 farms in the country to ship their

finished hogs to Niman Ranch, a new marketing program highlighting the use of sustainable and animal welfare practices. At the same time, they were transitioning the farmland to organic production in order to enhance both environmental and economic benefits of using longer crop rotations and avoiding potentially polluting chemicals. In 1999, Tom helped start the organic pork program at Organic Valley, the largest organic cooperative in the United States.

The Frantzens were nominated for the award by ISU agronomy and horticulture professor Kathleen Delate. She said in her letter of support: “I was introduced to Tom at his presentation at the Midwest Organic and Sustainable Education Services (MOSES) conference, where I noticed immediately how he was willing to share his experiences—good and bad—in order to help others farm more sustainably. I approached Tom and Irene about their potential role as on-farm



*Tom and Irene
Frantzen*

cooperators in an organic fertilization study I was undertaking, and they met the challenge with enthusiasm, kindness and precision in details.”

The Spencer Award was presented on March 23, 2016 at the 10th annual Iowa Water Conference in Ames. The commemorative plaque and check for \$1,000 were given by Leopold Center Advisory Board member Jody Kerns, who represents the State Soil Conservation Committee.

The Spencer Award wasn't the first time that the Frantzens were recognized for their contributions to sustainable agriculture. Their efforts have been celebrated by other organizations such as the Isaac Walton Outstanding Soil Conservationist Award; PFI Sustainable Agriculture Achievement Award; MOSES Farmer of the Year Award; and PFI Master Researcher Award.



CRP field, pollinator plants

CENTER FUNDS EDUCATIONAL OPPORTUNITIES FOR IOWANS



Aaron Heley-Lehman, Field Day

The Competitive Educational Support Program (CESP) is funded by the Leopold Center to encourage sustainability-focused educational events outside the regular research grants program. Iowans with ideas for one-time educational events, programs, workshops, conferences, performances or displays can apply for up to \$1,000 to support their project. (See details at www.leopold.iastate.edu/grants/education.) The program is managed by communications specialist Carol Brown with input from a review committee.

Here are the events that the Center assisted in staging during FY2016:

**July 16-18: UNI Tallgrass
Prairie Center, \$1,000**

**Iowa Prairie Conference at University
of Northern Iowa, Cedar Falls**

The conference, themed “Working Prairies,” highlighted efforts to incorporate native prairie into agricultural landscapes for soil and water conservation, water restoration, nutrient reduction, renewable energy and wildlife habitat.

**July 17-19: Seed Savers Exchange, \$1,000
Annual conference and campout
in Decorah**

The conference celebrated SSE’s 40th anniversary as an organization and there were over 300 participants. The CESP funds supported scholarships for eight young farmers to attend. They are interested in conservation and sustainable farming practices and are sharing what they learned at the conference with others in their communities.

**August 30: Prairie Rivers of Iowa, Ames, \$250
Local Food Cycle**

The 2015 Local Food Cycle was a 35-mile ride in the Nevada and Colo areas to highlight local food and area farmers. There were 70 bicyclists on the ride, and they made stops at Walkabout Gardens, Trinity Farms and others, wrapping up at Niland’s Café in Colo, with root beer floats and a hayride.

**October 18: Our Yesterday Inc., \$500
Fall Heritage Harvest, Mediapolis**

This annual event attracted more than 300 people to celebrate the benefits of rural living and the history of agriculture through demonstrations, tours, and hands-on activities.

**November 6-7: Women, Food and
Agriculture (WFAN) Network, \$1,000
WFAN annual conference, Davenport**

The WFAN conference included pre-conference field tours, a performance of the play “Map of My Kingdom” and a farm-to-table tasting event, in addition to keynote address and breakout workshops. There were 180 attendees at the event.

**November 22-23: Iowa State University
Horticulture Department, \$990**

Iowa Organic Conference, Iowa City

The 15th annual Iowa Organic Conference was held at the University of Iowa with more than 325 attendees from five states. The conference included a Local Foods Expo, which the CESP grant helped to fund.



CRP field, pollinator plants



*Kathleen Delate,
Iowa Organic Conference*

November 12: Sustainable Iowa Land Trust (SILT), \$500

SILT's first birthday celebration, Hotel Pattee, Perry

The CESP grant provided funds for five farmers from the Lutheran Services of Iowa Global Greens program to attend the event. The fund-raiser included a reception, dinner, and program about the land preservation group.

December 18: ISU Community Design Lab, \$500

Ag Urbanism Toolkit Annual Event, Reiman Gardens, Ames

The CESP grant supported travel scholarships for five community partners to attend, and helped with printing of an informational brochure. The day-long event brought together individuals and organizations from across the state to learn about programs going on within Iowa communities such as shared-use kitchens, incubator farms, farmers markets, school gardens and more.

February 2-3: ISU Agronomy Extension, \$1,000

Soil Health Conference, Iowa State Center, Ames

The CESP grant helped to bring regionally and nationally-known speakers to the first annual conference including Jo Handelsman, associate director for science at the White House Office of Science and Technology Policy, and Wayne Honeycutt, Deputy Chief for Science and Technology and USDA-Natural Resources Conservation Service (NRCS) in Washington, D.C. There were 235 attending the event.

March 23: Iowa Water Center, \$1,000

Iowa Water Conference, Iowa State Center, Ames

The grant supported travel expenses for Luther College students to present the multi-media "Body of Water" performance, and for Ames High School students involved in The Bluestem Institute to display their photo collages on specific water quality issues prior to the performance.

April 13-23: Winneshiek Energy District, \$400

Up! Up! Film Festival, Winneshiek County

The festival included 14 independently produced films and video shorts exploring the topics of farmland access, rural livelihoods, sustainability, local food and more. The event attracted more than 150 people from three states; the majority were between 18-34 years-old.

June 23-24: Nahant Marsh Education Center, \$500

Quad Cities Conference, Davenport

The second annual Quad Cities Pollinator Conference was held at the River Center in Davenport. More than 275 people attended the two-day event which included speakers and habitat tours. Participants came from 11 states for the conference.



GPSA STUDENTS

PURSUE NATURAL RESOURCES RESEARCH

The Graduate Program in Sustainable Agriculture (GPSA) has received support from the Leopold Center, with matching support from the College of Agriculture and Life Sciences, since it was established at ISU in 2003. Matthew O'Neal of the ISU entomology department is the faculty administrator for the GPSA program, and Angela Stone serves as program coordinator.

In FY2016, Leopold Center financial assistance funded portions of several GPSA research assistantships. Some of the recipients of those awards describe their work:



ALA KHALEEL

M.S. in Natural Resources Ecology and Management

It has long been recognized that when strategically integrated into agricultural landscapes, trees can enhance ecological functionality and contribute to income diversity. Our primary research goal is to evaluate the potential of agroforestry plantings to provide biomass and carbon sequestration opportunities in the upper Northern Great Plains (North and South Dakota, Kansas, and Nebraska). Agroforestry is the intentional integration of trees/or shrubs into crop and animal production systems.

Broadly, we seek to understand the role of trees in improving soil health, which in turn strongly mediates a broad array of ecosystem service outcomes. In achieving this goal, our specific objectives are to:

- 1) measure soil organic carbon content beneath existing agroforestry plantings (field windbreaks and riparian buffers)

and compare that with adjacent crop fields, and 2) use the findings to help test the USDA's farm-level carbon sequestration model, COMET- VR, which is being used to predict farm to regional estimates of potential carbon sequestration with agroforestry practices. During summer 2015, more than 600 soil samples were collected for analysis from the study sites, and used to quantify various aspects of soil organic carbon dynamics and qualify soil quality improvements.

During my first year, I was responsible for soil samples processing and analyses in the National Laboratory of Agriculture and the Environment in Ames. Completed analyses include total organic and inorganic soil carbon, total nitrogen, pH, soil texture, aggregates stability, particulate organic matter, saturated hydraulic conductivity, and bulk density. Work continues on technical analyses and eventually there will be more field data to be analyzed. We look forward to presenting preliminary findings at various conferences such as the Annual Meeting of the Society of American Foresters in Madison, Wisconsin in late 2016.



JOHN KRZTON-PRESSON

M.S. in Horticulture

Vegetable growers in the Midwest are facing many new challenges: increasingly erratic rainfall, herbicide-resistant weeds, decreased soil and water quality, and greater attention to food safety. My research on the use of strip-tillage and rolled cover crops in muskmelon production seeks to answer questions that will help farmers manage in a new agricultural landscape. This

research addressed two specific questions:

- 1) Can the use of strip-tillage and a rolled cover crop be equally or more profitable than conventional tillage with plasticulture?
- 2) Can a rolled cover crop mulch serve as a physical barrier between muskmelon fruits and soil contaminated with human pathogens?

This research has generated much interest among growers and has been the subject of experiments at several vegetable farms across the state. I presented on the subject at several ISU Extension field days and also presented my research at the American Society of Horticultural Science (ASHS) annual conference in August 2016.



ROBERT VALEK

Ph.D. in Natural Resource Ecology and Management

As a Graduate Research Assistant, my work focuses on designing and facilitating the execution of software development activities for People in Ecosystems/ Watershed Integration (PEWI, <http://www.nrem.iastate.edu/pewi/>). PEWI is a simple web-based educational game designed to provide a scientific platform for teaching, discussing, and evaluating the tradeoffs associated with agricultural land use and management. Over the past year I have attended over a dozen outreach and stakeholder-focused events to better understand agricultural stakeholders in Iowa and the Midwest. I also have implemented a large update backlog to PEWI, designed and began building the next phase, and started preliminary research for additional land use modules in the program.



WALLACE CHAIR FOR SUSTAINABLE AGRICULTURE RESEARCHES AG ALTERNATIVES

The Henry A. Wallace Chair for Sustainable Agriculture at Iowa State University is currently held by ISU agronomy professor Matt Liebman. The Leopold Center has provided ongoing support for the Wallace Chair for nearly two decades. Funds from the Leopold Center (\$20,000 annually) are used to help staff a variety of research projects led by Liebman. (See <http://www.wallacechair.iastate.edu> for more details.)

FY2016 Leopold Center funding provided support for graduate student Julie Mueller, who is pursuing an M.S. degree in Sustainable Agriculture. Her M.S. thesis project is focused on the effects of prairie conservation strips on soil properties. Some of the funds were used to cover a portion of her salary (stipend), benefits and tuition. Other Leopold Center funds paid for the services of an Agricultural Specialist who conducted field activities (planting, harvesting, soil and biomass

sampling, and lab analyses) for Liebman's research projects.

Liebman's research, teaching and outreach activities focus on ways to use ecological processes to create farming systems that are productive, profitable, resilient and environmentally sound. His specific interests include comparisons of different crop rotation and crop management systems, weed ecology and management, and the use of native perennial species for soil and water conservation and biofuel production.

Liebman is a team member on three projects studying three cropping systems in central Iowa: the Marsden Farm rotation experiment, the Science-based Trials of Row-crops Integrated with Prairie Strips (STRIPS) experiment, and the Comparison of Biofuel Systems (COBS) experiment.

INVESTMENT IN IOWA LEARNING FARMS AND WATER ROCKS! PAYS OFF



L.C. Nielson Field Day, 2015

Field days and farmer workshops have been at the heart of the Iowa Learning Farms (ILF) program since its inception in 2004. During FY2016, ILF hosted 33 field days and workshops for farmers and landowners with more than 1,700 in attendance. Since 2004, ILF has held 240 farmer-centered events that reached more than 11,000 attendees. Leopold Center support has been instrumental in allowing ILF to establish and grow these programs.

Over the years, ILF has developed an evaluation process to gather feedback and improve the effectiveness of its outreach. Their “Field Day Success Loop” is based on the findings from the 2015 field day evaluation data. If farmers attended three or more field days, they were more likely to report influencing other farmers than if they only attended one field day. ILF staff found that the more cover crop acres that farmers reported planting, the more successful they were at influencing others to try conservation practices. These farmers and landowners are excellent advocates for conservation, extending ILF’s influence to 61 percent more

farmers beyond those attending an ILF field day. The full 2015 report is available on the ILF website: www.iowalearningfarms.org/ilf/content/ilf-reports

Iowa Learning Farms continues to be a leading voice in Iowa on cover crop research, outreach and education. With help from the Leopold Center, the Iowa Cover Crop Working Group, under ILF leadership, has the longest running on-farm winter rye cover crop project in Iowa. Reports on “Winter Cereal Rye Impacts on Yield and Soil - Year 7 Update” are now available on the ILF website.

The “Conservation Chat” podcast began in 2015 and continues to highlight farmers and agricultural leaders working to improve soil and water quality. There are now 21 episodes available. Jacqueline Comito, ILF program director, talks casually with guests about conservation and agriculture, integrating humor and stories to discuss serious topics such as farm succession and achieving the Iowa Nutrient Reduction Strategy goals. The podcasts are found at www.conservationchat.org.

Water Rocks!

A record breaking year for Water Rocks! outreach was achieved thanks in part to Leopold Center funding. From July 2015 to June 2016, Water Rocks! engaged with over 20,000 learners at 153 community and youth events, including all 11 days at the Iowa State Fair, a 64 percent increase in visitors over 2014. Iowans of all ages learned about conservation practices for both urban and rural areas, water quality, watersheds, wetlands, soil, storm water and biodiversity. They are on pace to interact with even more learners this year, having already surpassed 9,000 attendees by the end of June 2016.

Water Rocks! hosted a winter Summit in December 2015 for 23 non-formal educators including ISU Extension staff, watershed coordinators, and naturalists. In June 2016, Water Rocks! held two teacher Summits for 67 Iowa K-12 teachers and high school students. At the Summits, attendees participated in activities, lectures and discussions and took home a supply kit valued at over \$800. The summer teacher Summits also included a field trip to see several conservation practices at work on Iowa farmland.

Eight Water Rocks! videos took home awards at the annual Iowa Motion Picture Association awards ceremony held April 19, 2016. The videos can be seen on the Water Rocks! website, YouTube and TeacherTube.

ILF and WR! Receive Recognition

Earlier this year, the ILF and WR! Team received an Iowa State University Professional and Scientific Council Team Award in recognition for its outreach and research efforts across the state. The team also was honored at the East Pottawattamie Soil and Water Conservation District’s annual banquet with a plaque in recognition and appreciation for outstanding dedication to soil and water conservation education and land stewardship.

ILF and WR! partners include Iowa State University Extension and Outreach, Leopold Center for Sustainable Agriculture, Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources (Section 319 of the Clean Water Act), Natural Resources Conservation Service, Conservation Districts of Iowa, Iowa Farm Bureau Federation, Practical Farmers of Iowa, and the Iowa Water Center.



ECOLOGY INITIATIVE



DRIVING RESEARCH INTO PRACTICE

At the start of 2016, Malcolm Robertson assumed responsibility for the Ecology Initiative's management and activities. Moving forward, the Ecology Initiative will remain focused on turning "research into practice," through targeted research in three key areas:

- Soil: improving knowledge of soil health and systems and developing practices that positively impact the self-renewing capacity of soil,
- Landscape: adoption of multiple sustainable practices in targeted Iowa agricultural systems and landscapes, and
- Water: improving water quality, hydrology, water use and water management.

Soil health and systems – understanding the process

Soil and its associated state of health continues to be an important topic in agricultural circles. The Leopold Center seeks to improve understanding of the mechanisms regulating soil health. This knowledge is essential to producers and their advisors as they identify optimal crop production practices and management strategies.

During the year, a number of completed projects shed light on the impact of various practices on soil health. In two of these projects, research was done regarding the makeup of the microbial community and ecological mechanisms involved with soil health aspects. These projects were done at long-term research sites initially set up with the help of Leopold Center funding.

"Understanding microbial contributions to soil aggregation and organic matter accumulation" - Kirsten Hofmockel and Elizabeth Bach, ISU Ecology, Evolution and Organismal Biology.

The PIs were able to leverage an existing collaborative project, Comparison of Biofuel Systems (COBS), which was established in 2008. The team for this project compared belowground factors (i.e., microbial biomass, composition, and enzyme activity) regulating soil organic matter formation, aggregation and long-term carbon storage among conventional and alternative cropping systems to provide a better understanding of managing soil carbon (C).

The research provided new insights into soil fungal community composition in classic and alternative cropping systems. Moreover, it highlighted the importance of soil microorganisms, particularly fungi, in providing key ecosystem services such as soil C retention in managed agricultural systems.

"Soil Health and Productivity in Riparian Grass Buffers: A Re-evaluation after 13 Years" - James W. Raich, ISU Evolution and Organismal Biology and Richard C. Schulz, ISU Natural Resource Ecology and Management.

In this project, researchers used the riparian buffer zone at Bear Creek, which was established 2001, to evaluate changes in soil health and aboveground biomass production that occurred over the past 13 years across a diverse array of grass buffers. Microbial activity had significantly increased, both in density and diversity when compared to the original analysis and these data suggest that greater plant diversity improves soil health dynamics by promoting organic matter formation and enhanced soil microbial activity.

Landscape research – transferring research into action Cover crops and third crops

The Leopold Center has a long history of supporting cover crop research and views cover crops as an important tool to promote soil health while reducing soil erosion and nutrient leaching.

"Predicting long-term cover crop impacts on soil quality using a cropping systems model" - Fernando Miguez, Sotiris Archontoulis and Andrea Basche, ISU Agronomy.

In the most recently completed Ecology Initiative cover crop project, investigators answered critical questions regarding the long-term impacts of a cover crop on soil and crop yields in corn and soybean crop rotations. Using both field data and a cropping systems model platform, investigators predicted that continuous use of a winter rye cover crop did not affect yields in a corn-soybean crop rotation, but did significantly reduce soil erosion. Additionally, the research showed a 34 percent decrease in nitrous oxide emission (an important greenhouse gas) from the system and reduced soil carbon loss by 3 percent. Moreover, the investigators reported improved soil water dynamics, including increased soil water storage over a series of wetter and drier seasons, when a winter rye cover crop was used.

Water

Water quality remains the cornerstone of the LCSA mission and research agenda. The majority of the Ecology Initiative projects have a direct or indirect focus on water quality.

“Performance of cropping systems designed to reduce nitrate leaching into shallow municipal well aquifers” – Robert De Haan and Ronald Vos, Dordt College; Matthew Schuiteman, AJS Farms; Nelva Huitink, Natural Resources Conservation Service; Rebecca Ohrtman, Iowa Department of Natural Resources; Harlan Kruid and Matthew Van Schouwen, City of Sioux Center.

In this recently completed project, five cropping systems were evaluated in an Iowa community reliant on shallow wells for the majority of its drinking water. The goal was to determine cropping systems that reduced the risk of nitrate N movement into shallow municipal aquifers, but still provided a reasonable financial return for landowners/operators. Data were shared with those who could benefit from the information (farmers, municipalities, Natural Resources Conservation Service, Iowa Department of Natural Resources, and the research community). As a direct consequence of the research, one producer, farming in the capture zone of the community well field, decided to change his farming practices. He adopted a corn-corn-alfalfa rotation rather than continuous corn production since it was shown to be an improved system for better water quality.

WORKING GROUPS AND RESEARCH TEAMS

The Leopold Center has a long history of initiating and or taking leadership roles in a variety of working groups and research teams. Many groups take up issues where research and answers are needed. Through targeted research and subsequent transfer of knowledge, these groups are able to develop applied solutions for real world concerns. Working groups and research teams in which the Center participates include:

Mid-American Agroforestry Working Group – promotes the practice and adoption of agroforestry in Iowa and the U.S. Midwestern region.

Green Lands, Blue Waters (GLBW) – a multi-organizational working group comprised of land grant universities and environmental and agricultural nonprofit groups that are involved in the development of new agricultural systems in the Mississippi River Basin.

The Science-based Trials of Rowcrops Integrated with Prairie Strips (STRIPS) – a team of researchers, educators and extension specialists who investigate the impact of incorporating prairie strips into conventional row-cropped agricultural systems.

SPECIAL PROJECT (COMPLETED)

“Does long-term use of cover crops affect soil health and quality as measured by the Haney Soil Test?” - Stefan Gailans, Practical Farmers of Iowa and Sarah Carlson, PFI Midwest Cover Crops Research Coordinator

This project was conducted at seven farms participating in a long-term, cover crop study. All farmer-cooperators employed corn-soybean rotations and planted replicated plots of either a cereal rye cover crop or no cover crop. Minor changes to soil health (soil's biological properties and the balance of soil C and N and their relationship to microbial activity) on the cover crop plots were detected, but they were not different compared to non-cover crop plots. Generally, it takes more than five years to detect changes in soil properties.



*Lisa Schulte Moore speaks
about the STRIPS program*



MARKETING AND FOOD SYSTEMS INITIATIVE



MARKETING AND FOOD SYSTEMS INITIATIVE SPINS OFF LOCAL FOODS TEAM

The Marketing and Food Systems Initiative (MFSI) was directed by Craig Chase in FY2016, with support from the Local Foods Team (LFT). Team members included Corry Bregendahl, Carrie Chennault, Arlene Enderton, Lynn Heuss, Kayla Koether, Ahna Kruzic, Courtney Long, Savanna Lyons, Leigh Rigby-Adcock, Caitlin Szymanski, Alice Topaloff, and Teresa Wiemerslage. While the MFSI will continue to be part of the Leopold Center research portfolio, the Local Foods program became part of Iowa State University Extension and Outreach, effective October 1, 2015. Chase will continue to serve as a Leopold Center initiative leader during the transition period and will coordinate the research done through MFSI with the LFT efforts.

Local Foods Team members concentrated their work in four core areas:

- beginning farmers (curriculum development, incubator farms, mentor programs, and prison farms);
- community development (community capacity building, agricultural urbanism toolkit, food health and access, farm to school, and FoodCorps);
- economic development (food processing, food hub business development, farmer profitability); and
- evaluation (conducting evaluations and evaluation capacity-building).

WORKING GROUP ADDED

The team continued to support the Regional Food Systems Working Group (RFSWG) and the Food Access and Health Collaborative (FAHC), and launched the new Iowa Food Hub Managers Working Group (IFHMG).

The food hub group met quarterly, and more than 30 individuals representing about 15 aggregators and distributors of local food attended the meetings regularly. Managers and guest presenters at the meetings discussed common challenges and shared information on managing for growth, sales and pricing strategies, evolving food safety regulations, coordination between food hubs, and other topics. Collaborations that sprang from the working group include a shared inventory tracking pilot project, which was funded by a North Central Region-Sustainable Agriculture Research and Education (SARE) Partnership Grant, as well as a SARE Professional Development Program mini-grant to send a delegation of seven Iowa food hub managers to the National Food Hub Conference.

COMMUNITY SHARED-USE KITCHEN PROJECT COMES TO FRUITION

A feasibility study funded by the Leopold Center (project M2012-06) has informed the creation of a shared-use commercial kitchen at the Robert W. Mickle Neighborhood Resource Center in Des Moines, Iowa. The Neighborhood Investment Corporation (NIC) purchased the building from Polk County in 2002 to operate an incubator for small for-profit and nonprofit entities. Early in 2016, NIC's board of directors voted to implement remodeling of the building's long-abandoned kitchen, and offer it as a community shared-use facility. NIC has worked with the Wallace House Foundation staff, an architect, and contractor to design and build the kitchen, set to open in the fall of 2016.

AG URBANISM SPREADING IN IOWA

The Agricultural Urbanism Toolkit is a planning process that helps Iowa communities explore their ag-related resources and needs to make fresh, local food products more widely available to residents at all income levels. The design process involves community capacity-building, research and analysis, public input, tactic prioritizations and design documentation and has been funded by the MFSI since its inception.

Three Iowa communities (Des Moines, Cedar Rapids, and Cresco) started the process in 2013. Coalitions built with the support of LFT staff in Des Moines and Cedar Rapids have "graduated" from the three-year process and will continue to operate independently to advocate for local food systems. Dubuque, Cass County, and several northern Iowa counties began agriculture urbanism projects in 2014, and Pleasant Hill held its first coalition meeting in June 2016. To learn more about the Agricultural Urbanism Toolkit, go to the resource page at: <http://www.extension.iastate.edu/localfoods/infrastructure-and-planning-agriculture-urbanism-toolkit/>.

NEW PUBLICATIONS AND TOOLKITS

Iowa CSA Farms: 2016 Statewide List of Iowa CSA Farms and Organizers (LF0012)

This directory lists 85 Iowa farms that operate Community Supported Agriculture (CSA) enterprises, with contact information, website links, available produce, and distribution range shown for each farm.

Cafeteria Coaching Toolkit (LF0011)

Cafeteria coaching encourages students to try new foods and eat nutritious school meals. This toolkit will guide users to set up cafeteria coaching programs at local schools.

Tools to Evaluate Your Coalition (LF0010)

A series of four publications by the Iowa State Extension and Outreach Local Foods team introduces the importance of coalitions and how evaluating those partnerships can be helpful.

Using Accounting Software for Food Hubs: Processing Traceable Orders

Based on an actual Iowa food hub, this tutorial takes a step-by-step approach, guiding users to expand their use of QuickBooks to improve product traceability, accounting, basic inventory management and recordkeeping.

Local Food Organizational Toolkit

This toolkit offers the business and financial elements of starting and coordinating a local food organization in Iowa.

Agriculture Urbanism Toolkit

An overview of Agricultural Urbanism as a design strategy for developing urban local food systems, as well as a brief synopsis of the ISU Community Design Lab's design process and its role in local food system development.

Resource Guide for Beginning Farmers

This is a resource for people interested in hosting a farmer training program, covering production practices, post-harvest handling, and business planning/basic finances.

MEMBERSHIPS AND SPONSORSHIPS

The Leopold Center has been an active member of the Sustainable Agriculture Food Systems Funders (SAFSF) group since 2013. SAFSF is “an international network of grant makers that works to foster communication, shared learning and information exchange about issues connected to sustainable agriculture and food systems.” Craig Chase was part of the recent Policy Impact conference planning committee, which met in Des Moines, Iowa, in December 2015. More than 60 members attended to talk about water quality issues, who controls research, the upcoming Farm Bill, and a host of other relevant policy topics. Chase also recently joined the membership committee and participated in the summer 2016 conference at Louisville, Kentucky. Thanks to relationships built through these activities, the Local Foods Team has received more than \$100,000 in grants from other members of SAFSF, and developed strategic partnerships related to local food coordinator training and other topics.

The LCSA became a sponsor for the *Journal of Agriculture, Food Systems and Community Development* (JAFSCD) in 2013. (FY2016 was the Center's third and final year in this capacity.) The journal focuses on public policy, research, and practice in food systems work, and emphasizes “accessible scholarship” that maximizes its usefulness in the transdisciplinary field of food systems.

Closely connected to JAFSCD is the North American Food System Network (NAFSN). NAFSN is intended to be a professional development network and provide a training platform and/or certification process for local food system practitioners. The Leopold Center and ISU Extension and Outreach continue to work with NAFSN on the development of a national certification program.





POLICY INITIATIVE



Jason Weller, NRCS Chief

The Leopold Center's Policy Initiative supports research on local, state or regional policies that affect the sustainability of natural resources and Iowa agriculture. It also supports policy-related aspects of work being conducted by the other initiatives, but does no public advocacy or promotion of specific policy alternatives. Initiative activities are managed by Mary Adams, outreach and policy coordinator.

SUSTAINABLE AGRICULTURAL LAND TENURE (SALT) INITIATIVE

The Sustainable Agricultural Land Tenure (SALT) Initiative is a long-running joint project of the Leopold Center and the Drake Agricultural Law Center in Des Moines. SALT uses a variety of tactics to educate landowners, farmers, their advisors and policy makers on sustainable land tenure arrangements and conducts research on developing land tenure issues that affect Iowa's sustainability and resilience. Leopold Center support has been provided through previous strategic investments, competitive grants and Policy Initiative infrastructure funds.

PROTECTING IOWA'S LAND LEGACY: SOIL AND WATER CONSERVATION POLICY – PAST, PRESENT AND FUTURE

Drake Agricultural Law Center, with help from a Leopold Center Policy Initiative grant, hosted a successful conference attended by more than 175 participants at Drake's Olmstead Center on November 19 and 20, 2015. Information about the conference is available at: www.drakeaglaw.org.

Participants included farmers, educators, government officials, staff of non-profits (environmental, agricultural, and professional organizational) and over a dozen members of the media. Keynote speakers included: Jason Weller, Natural Resources Conservation Service Chief; Dennis Keeney, former director of the Leopold Center for Sustainable Agriculture; and Patricia Beneke, director and regional representative for the United Nations Environmental Programme's Regional Office for North America.

Ten leaders who have been strong proponents of soil and water quality improvements were honored with Stewards of the Soil awards: Mark Ackelson, Richard Cruse, Liz Garst, Dennis Keeney, Dan Looker, Teresa Opheim, Duane Sand, Max Schnepf, Paul Willis, and Roger Wolf.

Partners and co-sponsors for the conference included: Wells Fargo; USDA Natural Resources Conservation Service-Iowa; USDA-ARS National Laboratory for Agriculture and the Environment; Dickinson, Mackaman, Tyler and Hagen PC; Peoples Company; Bob Riley and Feed Energy Company; the Lillian Goldman Charitable Trust; the Iowa Natural Heritage Foundation; Practical Farmers of Iowa; the Iowa Water Center; the Iowa League of Cities; Iowa Learning Farms; the Center for Rural Affairs; the Soil and Water Conservation Society; and the Iowa Soybean Association.

Earlier, the Drake Ag Law team conducted four focus groups involving more than 50 participants to help shape the conference: Iowa Natural Heritage Foundation (20 participants), NRCS (8), Iowa Soybean Association (12), Centerville landowners and conservation professionals (18). This work played a key role in identifying topics and helping shape the program. A 20-question survey was generated directly from these workshops and 116 people attending the conference completed the survey. Those results are available at: <http://drakeaglaw.org/wp-content/uploads/2015/11/Survey-results-pre-SOIL-conference.pdf>

The Drake group will continue to develop resources coming out of this conference. Follow-up comments to the conference indicate that using this format to convene diverse stakeholders of Iowa soil and water resources was well received. A common theme in these comments is for more events like the Saving Our Iowa Land conference to move the conversation forward toward real solutions for sustaining Iowa land.



Stewards of the Soil award winners

OTHER POLICY-RELATED ACTIVITIES

“What Do International Climate Change Initiatives Mean for Iowa’s Farms: A Business-Driven Response to Climate Change – a Drake Perspective” was held at Drake University’s Cartwright Hall on April 14, 2016. The Drake Agricultural Law Center (with additional sponsorship from the Leopold Center) hosted the gathering of more than 45 Iowa farm leaders and friends of Iowa agriculture to talk about Iowa farms and climate change. The workshop featured panelists such as farmers, an agricultural journalist, officials from USDA, an ag retailer, a feed manufacturer, a staff member from the Iowa Soybean Association, a researcher from Iowa State University, and a program specialist on climate change from an international NGO. Participants represented the full spectrum of Iowa agricultural stakeholders. The facilitated discussion revealed an increased interest within the Iowa agricultural community to pursue emerging opportunities to tie soil health, water quality, and other conservation concerns to both adapting to and mitigating the consequences of climate change. Information about the event can be found at: www.drakeaglaw.org/climate-change-workshop.

SPECIAL PROJECTS WITH POLICY INITIATIVE BACKING

“Watershed Stories: Grassroots Efforts in Iowa’s Raccoon River Watershed,” Betty Wells, ISU Sociology, and Angie Carter, Augustana College.

The culminating event for the project was held June 12, 2016. “River Stories: Views from an Iowa Watershed,” a community photo exhibit, took place at the Town/Craft Center in Perry, Iowa. The exhibit was created by a group of six area women landowners during the spring of 2016. The landowners took part in a participatory project documenting their experiences in the watershed through photographs and short narratives, or “photostories.” After the event, the landowners will share these photostories at other events in communities around the state, and a publication will be available about the photos.

“Iowa Landowners Legal Guide,” Drake Ag Law Center.

Drake staff used Policy Initiative infrastructure funding to research and write educational materials relating to the *Iowa Landowner’s Legal Guide*. It will be used to help educate Iowa landowners and their advisors and to enhance partnerships with other organizations using SALT resources.

The *Iowa Landowner’s Legal Guide* offers a comprehensive discussion of legal issues facing Iowa landowners – both new and existing – and their advisors. The book fills an important need in providing timely and accessible information to answer many of the questions landowners have about their duties, rights and responsibilities. Topics addressed include common legal issues such as fence law and drainage, as well as important issues of working with USDA agencies such as Farm Service Agency and NRCS, and the role of landowners in conservation and sustainability. The book is structured using a question-and-answer format and the text is based on input received from various stakeholder groups identifying the type of information most helpful to landowners and others and their frequently asked questions.



CROSS-CUTTING INITIATIVE



Kathleen Delate talks about crop rotations at a field day

CROSS-CUTTING INITIATIVE TACKLES INTEGRATED FARMING SYSTEMS

Integrated farming systems are at the foundation of the Cross-Cutting Initiative efforts. Under the direction of Malcolm Robertson, the initiative, now in its fifth year, is proud to have provided seed money for a number of long-term agro-ecological research projects that have received national recognition and have leveraged Leopold Center funding for larger grants. Additionally, the initiative has tackled broader research topics such as aquaponics, and prairie establishment, bioenergy and livestock issues. During the past year, a number of projects were completed in both the competitive and specialty alternative agriculture research sector.

Investigating alternative agriculture - as a substitute or addition to conventional agriculture

Aquaponics offers promise as an alternative crop and protein production system for smaller farm operations. The Cross-Cutting Initiative supported a one-year pilot project for aquaponic research in 2013. It evaluated the long-term practicality of the aquaponic enterprise for economic and environmental sustainability. The investigator compared three types of plant-growing materials (rock wool, pea gravel and floating rafts) in a recirculating aquaponic system used to grow basil, lettuce and Nile tilapia.

“Food safety, economics and environmental impacts of aquaponics in Iowa” Allen Pattillo, ISU Extension Fisheries and Aquaculture Specialist.

Recently completed research, funded by the Leopold Center, examined several aspects of aquaponic production including food safety, profitability and environmental impacts of aquaponics operations. Six research-scale aquaponics systems were built and the resource use and production yields from the systems were evaluated. Techno-economic analysis (TEA) and life cycle assessment (LCA) indicate aquaponics could be profitable in Iowa on a commercial scale.



photo courtesy Kathleen Delate

“Suitability of winter canola (*Brassica napus*) for enhancing summer annual crop rotations in Iowa” Mary Wiedenhoeft and Rafael Martinez-Feria, ISU Agronomy; Tom Kaspar, Plant Physiologist, National Laboratory of Agriculture and the Environment; and Keri Jacobs, ISU Economics.

The potential of winter canola (*Brassica napus*) as a third crop for enhancing summer annual crop rotations in Iowa was evaluated in a project initially funded by the Ecology Initiative. The financial aspects of winter canola and the economics and costs/benefits of adding canola as a third crop or a cover crop in crop rotations in Iowa were investigated.

The data suggest winter canola provides environmental and economic enhancements to summer annual crop rotations in Iowa, but the specific situations into which canola can fit are limited. More research is needed to fully understand the productivity potential of winter canola before promoting these crops as feasible alternatives for Iowa producers.

“Demonstrating Farrowing Alternatives for Small-Farms: Insulated Tents for Sows and Pigs” Pete Lammers, Illinois State University, Department of Agriculture; and Jay Harmon, ISU Agricultural and Biosystems Engineering.

Pigs fill an important niche in integrated crop and livestock farming operations and have long been a key component of financially sound family farming in Iowa. Pork niche markets provide an expanding sales outlet for farmers unwilling or unable to raise pigs at the scale typical of present-day commodity agriculture. This project demonstrated that modifying a commercially available yurt kit as a farrowing facility is possible, but is likely to be cost-prohibitive for most farmers. A producer guide for crate-free farrowing was developed from the research.

SPECIAL PROJECTS

Current

“Energy management for agricultural production,” Mark Hanna and Jay D. Harmon, ISU Agricultural and Biosystems Engineering.

This project addresses two separate energy research topics:

- 1) Solar photovoltaic (PV) energy: A case study will be developed gathering the “hands-on” experience from a producer who adopted solar PV on-site for his farm operation. The producer has gained experience over a couple of years and evaluated factors involved with his on-farm solar generation system. A bulletin will be developed to educate potential solar PV adopters on important items to consider when deciding whether to invest in solar PV adoption. Among them are how to assess current electrical use and potential for payback of PV system; whether to install on-the-farm or offset farm electricity by participating in a group solar project (e.g., community “solar garden”); whether to install roof or land solar panels; insurance/safety/fire/snow concerns; federal and state tax credits, etc.
- 2) Grain drying energy measurement: Two years of data collected on drying energy used by three ISU farms indicate that the cost of propane to dry fall-season corn cancels any yield benefits. This data is starting to be used to encourage farmers to plant earlier-season corn in fields that are harvested first to lower propane energy use. An additional year of grain drying energy data is needed, and will be used to inform farmers about how much energy they are using and actions they can take to reduce use.

Completed

“Develop a Fruit and Vegetable Marketing Website,” Mark Honeyman and Nick Howell, ISU Research Farms; and Leah Riesselman, ISU Horticulture.

The objective of this project was to develop a website accessible to university faculty, staff, and students to market fruit and vegetables produced by the Ag Education 465 class, the ISU Student Organic Farm, and the ISU Horticulture Research Station. In order to bridge the gap between farm products and direct-to-consumer sales, the ISU Horticulture Research Station and the ISU Student Organic Farm used the website to market their products together with the class. This joint partnership not only increased product availability to the targeted consumers, but also expanded commodity selection, thereby increasing both supply and demand for website sales. The site was very successful in the first five months of operation and marketed 1,332 units of 51 fruits and vegetables that generated \$6,104 in sales.

“Development of Software for Diet Evaluation and Formulation Assistance of Domestic Meat and Dairy Goats,” Garland Dahlke, ISU Beef Center.

Many Iowa livestock specialists occasionally receive nutrition questions regarding the less common livestock species such as goats. Unlike cattle, sheep, hogs or poultry, these species may lack a formal support system within the scientific community in Iowa. Often, the specialists resort to using sheep nutrition concepts to provide answers, but goats have different dietary requirements. To address this problem, Cross-Cutting Initiative funds were used to develop a low-cost, software package that a consulting advisor could use quickly and easily to answer basic nutrition questions and evaluate a current feeding program, especially for meat or dairy goats.

FY2016

CENTER COMPETITIVE GRANTS PROGRAM

ECOLOGY INITIATIVE

The Ecological Systems Research Initiative funded seven proposals received from the Summer 2015 RFP. Eight projects were granted no-cost extensions or slated to end.

New Ecology grants – FY2016

Total amount awarded – \$614,514

Total number of projects – 7

NEW Bio-based antibacterial seed treatments to improve soil and plant health, 2 years

R. Cademartiri, ISU chemical and biological engineering, materials science and engineering; S. Goggi, ISU agronomy
Bacteriophages are viruses that attach to specific receptors on the surface of bacteria. This specificity means a bacteriophage can infect only certain receptors to which they can bind, allowing them to target and destroy harmful bacteria and not beneficial bacteria. This project will test the efficiency and survivability of bacteriophages when combined with common polymers used for seed treatments.

Crop diversity effects on soil organic matter and nitrate retention in surface and subsoils, 2 years

M. Castellano, ISU agronomy

This research looks at what happens deep within the soil profile (2-3 ft. below the surface) when alfalfa is added to the typical corn-soybean rotation. The key question is whether an extended rotation improves the soil's ability to store carbon and organic matter at lower depths, making the soil more resilient to drought and to soil erosion and nutrient losses after heavy rainfall.

NEW Development of Field Mobile Soil Nitrate Sensor Technology

D. Laird, N. Rogovska, ISU agronomy; C. Chiou, L. Bond, ISU Center for Non Destructive Evaluation

The overall goal of this research is to develop soil nitrate sensor technology that can be attached to farm implements and used to determine in-real-time, on-the-go soil nitrate concentrations with sufficient accuracy (parts per million range) to facilitate precision application of nitrogen fertilizers during late spring sidedress applications.

NEW Does increasing landscape diversity in farmed closed depressions (potholes) increase profitability and ecosystems services?, 2 years

A. Kaleita, M. Soupir, ISU agricultural and biosystems engineering; A. Van Looke, E. Heaton, ISU agronomy

Within the Prairie Pothole Region of the upper Midwest, there are a significant number of farmed wetlands and drained potholes. This project aims to stimulate farmer consideration of “retiring” farmed potholes into land cover that both improves water quality and saves money. The project will measure key pothole and plant production metrics, and also model pothole hydrology and productivity comparisons of farmed vs. perennial cover.

Improving soil health and water quality through better soil phosphorus assessment and management practices, 2 years

A. Mallarino, ISU agronomy and M. Helmers, ISU agricultural and biosystems engineering

This research assesses the value of no-tillage and subsurface-banded applications of phosphorus fertilizer, especially as they relate to surface runoff. The information will be used to improve soil test recommendations for farmers.

Grazing prairie: Improving species diversity while maintaining cattle and goat productivity and resting home pastures, 4 years, extended

D. Ryan and L. Appelgate, Iowa Heartland Resource Conservation and Development, Ankeny; L. Lown, Natural Resources Specialist, Polk County Conservation Board

The investigators seek to increase species diversity at Chichaqua Bottoms Wildlife Area in Polk County by grazing cattle on a 263-acre reconstructed prairie and browsing goats in three oak savanna areas degraded by invasive species. Calf-weaning weights, body condition scores, and the economic value of winter forage harvested or stockpiled on resting home pastures also will be measured.

Impacts of landscape and on-farm diversity on the abundance and health of bee pollinators, 3 years

A. Toth and A. Dolezal, ISU ecology, evolution and organismal biology; M. O'Neal and E. Hodgson, ISU entomology

The goal of this project is to better understand how agricultural landscape diversity and approaches to pest management impact the health of native bees and other pollinators. The experiment considers bee health in the context of landscape diversity, examining bees in both conventional row-crop systems and farms growing fruit and vegetables for Community Supported Agriculture (CSA) enterprises.

The Leopold Center funds a wide variety of research, education and demonstration projects aimed at increasing the sustainability of Iowa agriculture. The projects are selected after a competitive process that includes a Request for Pre-proposals (RFP) in June, multiple reviews and assessment of full proposals submitted in November and awarding of funds in January.

Integrating project knowledge and models: The next step in developing a Payment for Ecosystem Services scheme for the Big Creek watershed, 1 year, extended
L. Schulte-Moore, J. Tyndall and T. Isenhardt, ISU natural resource ecology and management; J. Gordon Arbuckle, ISU sociology; K. Franz, ISU geological and atmospheric sciences; E. Heaton and M. Liebman, ISU agronomy; and M. Helmers, ISU agricultural and biosystems engineering
The investigators will further the development of a pilot Payment for Ecosystem Services (PES) framework. Focusing on central Iowa, they will integrate data and knowledge from prior research in the Big Creek watershed in preparation for using an ecosystem services model called InVEST. Widely used outside of Iowa, this model is popular for its capacity to link providers (farmers, landowners) with beneficiaries (the public) by estimating the dollar value of multiple ecosystem services.

NEW Investigation of bacterial community structure and antibiotic resistance and genetic mobility gene abundance in soils fertilized with swine manure, 1 year
S. Hinsla-Leasure, Biology, Grinnell College, Grinnell, IA

The spread of antibiotic resistance from concentrated animal feeding operations (CAFOs) to soil, crops, and waterways is an issue of concern in agriculture. Working with a local swine farmer, the researcher will build on previous work, studying E.coli levels in soil fertilized with swine manure, quantifying the amounts of seven antibiotic-resistant genes in manure and soil samples, pre- and post-manure application.

NEW Micro-algae-based fertilizer for nitrogen and phosphorus loss reduction, 2 years

D. Jarboe, ISU Center for Crops Utilization and Research; D. Grewell, ISU agricultural and biosystems engineering; J. Schrader, ISU horticulture; Z. Wen, ISU food science and human nutrition; A. Mallarino, ISU agronomy; J. Sawyer, ISU agronomy

The grant will develop new bio-based, slow-release fertilizers that use microalgae produced from wastewater treatment systems. The researchers will produce algae feedstock using municipal and industrial wastewater, then formulate and manufacture fertilizer pellets composed of various levels of algae biomass, biochar, and polylactic acid (PLA). Lab testing will be done to evaluate the nutrient release characteristics.

Quantifying nitrogen credits and impacts of cover crops on soil biology and health in vegetable cropping systems in Iowa, 1 year, extended

A. Nair, ISU horticulture extension; K. Delate, ISU horticulture and agronomy; C. Bregendahl, Leopold Center for Sustainable Agriculture; G. Artz, ISU economics

The study will collect data on cover crop nitrogen credits, nitrogen scavenging capacity, biomass generation capability, weed suppression properties and effects on soil quality and health in vegetable cropping systems. It will survey traditional crops (cereal rye, oats) and nontraditional cover crops (brassicas, mustards, peas, clovers, etc.). Cost-benefit analyses and enterprise budgets will be created for different cover crop types.

Prairie contour strips: Demonstrating the importance of custom seed mix for biological integrity, 2 years

L. Jackson, biology, University of Northern Iowa, Cedar Falls

This project seeks to create a community of practice among prairie restoration specialists, technical service providers and landowners and land managers that is focused on prairie contour strips. Through its Prairies on Farm Project, the Tallgrass Prairie Center hopes this network can establish demonstration sites on farms and develop educational materials, including an online seed mix calculator, that will lead to broader awareness and use of prairie and prairie contour strips in Iowa.

Quantifying the effect of perennial vegetation on soil and water quality, 3 years, extended

T. Isenhardt and R. Schultz, ISU natural resource ecology and management, and K. Schilling, Iowa Department of Natural Resources

The investigators are using data from a well-established research site (Bear Creek in Story County) to interpret the influence of perennial vegetation on soil biogeochemical processes. The information will be used to develop a tool to assess the potential impact of changes in land use on the quality of stream water.

NEW Soil health in biofuel cropping systems, 3 years

M. Thompson, M. Liebman, ISU agronomy; M. Helmers, ISU agricultural and biosystems engineering

This project explores the impacts of both annual and perennial feedstock production systems on soil health, and whether soil health tests will help producers to make better management decisions that promote both crop production and sustainable landscapes. This research will take place at the Comparison of Biofuel Cropping Systems (COBS) site at Iowa State University, which is designed to compare lignocellulosic biomass production and environmental impacts for continuous corn grown for grain and stover.

Use of grazing management to mitigate greenhouse gas emissions while increasing soil organic matter and water-holding capacity of cool season pastures in southern Iowa, 3 years, ending

J. Russell, ISU animal science; W. Powers, Michigan State University; and T. Isenhardt, ISU natural resource ecology and management

The chief investigator's long-term goal is to quantify the effects of grazing management on the flux of major greenhouse gases, and assess the relationships among greenhouse gases, soil organic carbon sequestration, botanical and chemical composition of vegetation, and physical characteristics of soil in southern Iowa grasslands. The grazing systems compared are continuous stocking, rotational stocking and mob-stock.

NEW What will it take to restore organic matter to Iowa's soils?, 3 years

R. Dietzel, S. Archontoulis, and M. Liebman, ISU agronomy

High levels of soil organic matter (SOM) in Iowa soils have made it one of the most resilient and productive regions in the world. There are many strategies aimed at restoring SOM in Iowa, but science's fundamental understanding of SOM dynamics is inadequate for designing agricultural systems that will contribute to SOM levels. Through modeling and actual test plots, this project aims to expand basic understanding of organic matter in Iowa.

Winter rye cover crop effect on corn seedling pathogens, 3 years, extended
T. Kaspar and T. Moorman, USDA-ARS National Laboratory for Agriculture and the Environment

While cover crops are an excellent management tool for sustainable agriculture, decreases in corn yield have been observed following winter rye cover crops. This project tests the hypothesis that glyphosate-killed rye cover crops are hosts for corn seedling pathogens. There will be studies in a controlled environment and on-farm field studies, as well as testing of management strategies to prevent or minimize corn yield decreases.

MARKETING AND FOOD SYSTEMS INITIATIVE

The Marketing and Food Systems Initiative funded four proposals received from the Summer 2015 RFP. One project received an extension to complete work.

New Marketing Initiative grants – FY2016

Total amount awarded – \$110,140

Total number of projects – 4

Agricultural Urbanism Toolkit, Years 2+3, 2 years


N. Anderson, ISU Extension and Outreach; C. Rogers and C. Long, ISU Community Design Laboratory

This project will expand use of the Agricultural Urbanism Toolkit created in 2014. Team members worked in three Iowa communities – Cedar Rapids, Cresco and Des Moines – in a year-long strategic planning process to understand and create a holistic food system that connects urban, rural, local and regional efforts to promote food accessibility in each community. The team will continue to work with the three pilot communities and establish the program in three new Iowa communities.

Building producer capacity for institutional food distribution, 2 years

M. Temeyer, Black Hawk County, ISU Extension and Outreach

Investigators will plan and develop a series of workshops to build the capacity of Cedar Valley producers to supply institutional markets in the region such as the University of Northern Iowa, supermarkets and a new Cedar Falls food co-op. The workshops will cover price negotiations, identifying crops, online ordering systems, food safety training, business planning and management. They hope to engage Burmese refugees with agrarian backgrounds who have settled in the region and have expressed interest in farm business development.



Increasing local food consumption in rural communities by partnering with non-traditional food retailers, 1 year
G. Windhorst, Iowa Food Hub, Decorah
The food hub will work with non-traditional retailers, such as meat lockers, feed stores and seasonal tourism attractions, to increase the access to local, healthy foods, especially fruits and vegetables. A new part-time marketing and sales assistant will help those retailers identify and market those foods in four rural communities with limited access to fresh foods.

NEW Investigating feasibility of food hub node expansion in Dubuque, 1 year
G. Windhorst, Allamakee New Beginnings dba Iowa Food Hub, West Union
Food hub nodes are small cold storage facilities that are managed remotely by a larger hub. This project proposes using the Iowa Food Hub infrastructure and sales platforms to further facilitate rural-urban partnerships, testing the concept of a food hub node in order to increase food hub development, and increase markets for locally produced food.

NEW Latino groceries in the rural Midwest: An examination of food security, cultural identity, and economics, 1 year
L. Bates, N. Ladjahasan, ISU College of Design; J. Wolseth, ISU Extension and Outreach, Community and Economic Development
This project will attempt to understand the existing capacity, barriers, and opportunities for Latino groceries to connect and build relationships with local food producers and distributors. Findings from case study research will provide valuable information for store owners, regional food coordinators, local producers, community development specialists, and ISU Extension personnel.

Machinery management for small- and medium-sized horticultural farms, 2 years
G. Artz and W. Edwards, ISU economics, and D. Jarboe, ISU Center for Crops Utilization Research and BioCentury Research Farm
The investigators will design and implement a survey of Iowa fruit and vegetable growers and develop a set of case study interviews with growers who have expanded their operations. The knowledge gained will be used to develop a user-friendly decision tool and educational materials to help growers who face a variety of machinery-related challenges.

NEW Reducing challenges for Iowa's beginning farmers through partnerships with Iowa financial experts, 2 years
S. Worley, S. Carlson, Practical Farmers of Iowa, Ames
This project will enable researchers to complete programming to meet the goals including: workshops on farm financials, help beginning farmers complete business plans and facilitate reviews of these plans, organize one-on-one consultations between beginning farmers and experts, hold webinars covering financial and business education, and publish educational materials.

Small-farm business development incubators for refugee farmers, 2 years
N. Wuertz, Lutheran Services of Iowa, Des Moines
This project continues work that began as part of 2011 and 2014 Leopold Center competitive grants to create a program to help recent immigrants to the Des Moines area establish their own agricultural businesses. LSI has set up the Global Greens Farm in West Des Moines, a site for community garden plots and an incubator training program. This project will develop the next step, quarter-acre plots for eight participants who will transition to their own land and successful enterprise over three to five years.

Supply chain management for Iowa regional food systems, 2 years
C. Krejci, ISU industrial and manufacturing systems engineering, A. Shaw, ISU food science and human nutrition
Investigators will work with two food hubs in Iowa and one logistics provider to apply supply chain management and food safety principles and methodologies to their operations. Partners include the Iowa Food Hub in Decorah, the Iowa Food Cooperative in Des Moines and Farm-Table Procurement based in Harlan, Iowa. They will analyze inbound and outbound logistics and aggregation/staging activities to maintain food safety and quality and increase efficiency.

NEW Workflow optimization for Iowa regional food hubs, 2 years
C. Krejci, M. Dorneich, R. Stone, ISU industrial and manufacturing systems engineering
This project will develop and implement a strategic operations management and workflow plan. This will enable Iowa food hubs to improve the effectiveness of a regional food hub's operations, the efficiency of regional food hubs distribution centers, and the satisfaction of employees and customers of regional food hubs.

POLICY INITIATIVE

The Policy Research Initiative funded one proposal received from the Summer 2015 RFP. Two other grants continued for a second year of operation.

New Policy Initiative grants – FY2016

Total amount awarded – \$37,500

Total number of projects – one

NEW Evaluating how private conservation initiatives may increase farmer adoption of conservation practices, 1 year

N. Hamilton, M. Russell, Drake University Agricultural Law Center, Des Moines

This project will examine the nature and range of private conservation initiatives (PCIs) underway in Iowa. As part of the project, researchers will collect and inventory examples of PCIs, develop methods to classify them, and provide a legal evaluation of how the terms and contracts used in the PCI compare to those in public conservation programs such as CSP and EQIP.

Reducing local regulatory barriers to local foods Phase 2: Local foods and county zoning project, 1 year (ending)

G. Taylor, ISU community and regional planning

The investigator will develop a guidebook for county officials in Iowa covering county zoning and land use regulations as they relate to agritourism, on-site processing and sales, event marketing and other activities that may be associated with local market farms. The guidebook will review legal issues associated with the agricultural exemption and its implications for county zoning codes and practices.

CROSS-CUTTING INITIATIVE

The Cross-Cutting Initiative funded four proposals received from the Summer 2015 RFP. Another five projects were renewed for a second or third year of funding or given extensions to complete their work.

New Cross-Cutting Initiative grants – FY2016

Total amount awarded – \$240,323

Total number of projects – 4

Attracting pollinators and natural enemies to add value to Iowa agriculture, 3 years, extended

M. O'Neal and D. Lewis, ISU entomology; M. Gleason, ISU plant pathology and microbiology; C. Haynes, ISU horticulture and agriculture education; A. Joseph, Iowa Department of Agriculture and Land Stewardship; and M. Duffy, ISU economics

The investigators are developing an outreach program to show Iowa stakeholders how they can increase the ecosystem services of wild pollinators and natural pest enemies. They will implement a paired-comparison experiment on five ISU farms throughout the state to test the hypothesis that adding a refuge of perennial plants attractive to beneficial insects will improve the delivery of ecosystem services to soybean and melon production. They will calculate a partial budget to isolate the effects of the beneficial insects-enhancement treatment on the value of the marketable harvest of muskmelon and soybean.

NEW Climate change adaptation in grassland agroecosystems, 3 years
D. Debinski, ISU ecology, evolution and organismal biology; C. Anderson, ISU agronomy; H. Feng, economics, Michigan State University, East Lansing; J. Miller, natural resources and environmental sciences, University of Illinois, Urbana-Champaign

The researchers seek to engage landowners and land managers to protect grassland and biodiversity through development of climate change adaptation strategies in the Grand River Grasslands (southern Iowa and northern Missouri). Researchers will identify priorities for the conservation of grassland ecosystems, identify the vulnerability to climate change of a suite of plant species, identify options that land managers can take now to prepare for future climate conditions, and evaluate these options with landowners and land managers to determine which options are most socially and economically feasible to implement.

Impacts of contrasting rotation systems and weed management regimes on weed dynamics and agroecosystem health, 3 years

M. Liebman, ISU agronomy; A. Johanns, ISU Extension and Outreach. Osage; J. Hill, University of Minnesota-St. Paul

This project uses data from a 22-acre cropping systems experiment at the ISU Marsden Farm to investigate differences in crop yields, soil properties, pathogen dynamics, agrichemical and energy use, production costs and net returns and selected ecological impacts. The plots compare three diverse crop rotations. It will provide new knowledge about weed seed bank dynamics and how herbicide regimes affect fossil energy inputs, greenhouse gas emissions, ozone formation and factors in Life Cycle Assessment (LCA).

NEW Improving economic sustainability of beef cow enterprises in the Midwest by mitigating tall fescue-related heat stress and determining the value of shade in grazing systems, 2 years

P. Gunn, J. Russell, ISU animal science; S. Ensley, ISU veterinary science; H. J. Sellers, ISU Extension and Outreach
This project will determine the impact of tall fescue concentration, endophyte infection, alkaloid concentrations, and shade presence on economic and production efficiency in pasture-based beef cow-calf systems. The project will be conducted on 10 cow-calf operations in south-central Iowa with varying proportions of tall fescue as well as available shade.

NEW Innovative Conservation Agriculture, 3 years

S. Berges, Allamakee Soil and Water Conservation District, Waukon
Farmers in Allamakee County will learn from this project about the benefits of cover crops, extended rotations using small grains, and no-till, especially on acres that have had manure application, in order to reduce nutrient and soil loss as well as improve soil health. Through educational efforts such as field days, one-on-one exchange, demonstration sites, signage, and news articles, farmers in the area will have various means to learn about conservation farming practices in order to adopt them on their farmland.

Linking soil and water quality with crop performance across a continuum of tillage and management strategies, Years 2 and 3, 2 years

K. Delate, ISU agronomy and horticulture; C. Cambardella and M. Bakker, USDA-ARS National Laboratory for Agriculture and the Environment, Ames; A. Johanns, ISU Extension and Outreach, Osage

This project uses established experiments, each with a unique crop rotation and management history, to look at long-term impacts of changes in soil microbiology on soil health. The three sites are the Long-Term Agroecological Research (LTAR) Experiment established in 1998 near Greenfield, the USDA-ARS Organic Water Quality site on the ISU Agronomy Research Farm in Boone County in its third year, and the Organic Reduced-Tillage site in its seventh year, also on the ISU Agronomy Farm. Additional soil and water samples will be collected as part of this grant, as well as development of Best Management Practices guides based on research results.

Long-term assessment of miscanthus productivity and sustainability (LAMPS), 2 years

E. Heaton, N. Boersma, and C. Bonin, ISU agronomy; I. Anderson, University of Iowa

This new research program, the Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS), builds on work by the University of Iowa's Biomass Partnership Project. The UI 2020 goal of 40 percent renewable energy could be met by burning sustainably produced biomass with fossil fuels in the University's power plant. Investigators plan to establish miscanthus fields at sites in northwest and central Iowa, in addition to the initial 15-acre field near Iowa City in southeastern Iowa.

NEW Maximizing conservation and return of investment on farms in the Turkey River Watershed, 1 year
R. Evellsizer, Northeast Iowa RC&D, Postville; A. Kiel, Iowa Soybean Association
The Northeast Iowa RC&D and the Iowa Soybean Association are partnering to encourage farmers in the Turkey River Watershed to use best management practices for soil and water conservation that will maximize their return on investment. The Turkey River Watershed Management Authority (TRWMA) has been working with landowners to improve the watershed since 2012, and a watershed plan was created in 2015. This project will encourage producers to incorporate practices in the plan to help the TRWMA reduce floods and increase water quality.

Sustainably growing Iowa's beef herds: Evaluating systems that provide economic opportunities while protecting soil and water resources, 3 years

H. J. Sellers, ISU Extension and Outreach; L. Schulz, ISU economics; P. Gunn, ISU animal science

Investigators will work with 24 beef producers using one of three grazing systems: traditional grazing, extensive grazing and limited grazing. Using benchmark data, they will analyze the environmental and economic sustainability of each model as well as the risk-bearing ability of each system. They will create case studies of practices for successful operations in each system to share with Iowa cow-calf producers.



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